PSYCHOLOGICAL STATUS AMONG ACUTE CORONARY SYNDROME PATIENTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA, KELANTAN AND HOSPITAL SULTANAH NUR ZAHIRAH, TERENGGANU

by

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Dissertation Submitted In
Partial Fulfillment Of The
Requirements For The
Degree Of
Master of Medicine
(EMERGENCY MEDICINE)

UNIVERSITI SAINS MALAYSIA
2016

Diperakui bahawa disertasi yg bertajuk PSYCHOLOGICAL STATUS AMONG ACUTE CORONARY SYNDROME PATIENTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA, KELANTAN AND HOSPITAL SULTANAH NUR ZAHIRAH, TERENGGANU merupakan kerja dan penyelidikan yang asli dari **ZATUL RATHIAH BT. SULONG @ ABDUL RAZAK**, nombor kad pengenalan: **830319-11-5292**, nombor matriks: **PUM 0169/12**, dari tempoh 2012 hingga 2016 adalah di bawah penyeliaan kami. Disertasi ini merupakan sebahagiaan daripada syarat untuk penganugerahan **Sarjana Perubatan Kecemasan**, segala hasil penyelidikan dan data yang diperolehi adalah hak milik terpelihara Universiti Sains Malaysia.

Tandatangan Pelajar

Tandatangan Penyelia Bersama,
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Tandatangan Penyelia Utama,
Pensyarah Jabatan Kecemasan,
Pusat Pengajian Sains Perubatan,
Universiti Sains Malaysia.

Tandatangan Ketua Jabatan,
Jabatan Kecemasan,
Universiti Sains Malaysia.

ACKNOWLEDGEMENT

Thanks to Almighty ALLAH for giving me strength and ability to understand, learn and complete my dissertation.

Firstly, I would like to express my sincere gratitude to my supervisor, Dr. Mohd Hashairi Hj.Fauzi for the continuous support of my Master study and my dissertation for his patience, motivation, and immense knowledge. His guidance helped me in all time of research and writing of this dissertation.

My since thanks also goes to Dr. Siti Azrin Ab Hamid, statistician and lecturer in the Department of Biostatistic and Research Methodology as my Co-supervisor for her insightful comment and encouragement, constructive criticism especially for the statistical analysis input for my dissertation.

I am also indebted to Dr. Abu Yazid Noh as the head of the emergency department for his support and guidance.

I am also thankful for Director of Hospital Sultanah Nur Zahirah who gave me the permission for doing my dissertation.

I thank my fellow batch mates in for the stimulating discussions and for all the fun we have had in the last four years. I greatly value their friendship.

Last but not the least, I would like to thank my family; my parents and to my brothers and sisters for supporting me spiritually throughout writing this dissertation and my life in general.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

ACS	Acute Coronary Syndrome
AHA	American Heart Association
AMI	Acute Myocardial Infarction
APEX	Accelerated Programme for Excellent
BDI	Beck Depression Inventory
CAD	Coronary Artery Disease
CABG	Coronary Artery Bypass Graft
CCU	Cardiac Care Unit
CHD	Coronary Heart Disease
CPG	Clinical Practice Guideline
CRW	Coronary Rehabilitation Ward
CVD	Cardiovascular Disease
DASS	Depression Anxiety and Stress Scale
DM	Diabetes mellitus
DSM 5	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition
ECG	Electrocardiograph
ESC	European Society of Cardiology
HADS	Hospital Anxiety and Depression Scale
HPL	Hyperlipidaemia
HPT	Hypertension
HRT	Hormone Replacement Therapy
HUSM	Hospital Universiti Sains Malaysia
HSNZ	Hospital Sultanah Nur Zahirah
IHD	Ischaemic Heart Disease

IqR	Inter-quantile Range
LBBB	Left Bundle Branch Block
LR	Likelihood Ratio
MI	Myocardial Infarction
MRI	Magnetic Resonance Imaging
NCD	Non-communicable Disease
NSTEMI	Non-ST Elevation Myocardial Infarction
PCI	Percutaneous Coronary Intervention
PTSD	Post- Traumatic Stress Disorder
PVD	Peripheral Vascular Disease
SD	Standard deviation
STEMI	ST-Elevation Myocardial Infarction
SPSS	Statistical Package for Social Sciences
UA	Unstable Angina
WHO	World Health Organization

ABSTRAK

KEADAAN PSIKOLOGI DIKALANGAN PESAKIT SINDROM KORONARI AKUT DI HOSPITAL UNIVERSITI SAINS MALAYSIA, KELANTAN DAN DI HOSPITAL SULTANAH NUR ZAHIRAH,TERENGGANU

PENGENALAN: Penyakit jantung koronari adalah satu jenis penyakit kardiovaskular yang paling biasa dan sering dinyatakan sebagai sindrom koronari akut (ACS) yang merangkumi pelbagai keadaan klinikal dari 'angina pectoris', angina tidak stabil, 'non-ST elevation myocardial infarction' dan 'ST elevation myocardial infarction'. ACS adalah penyebab biasa kecemasan kemasukan ke hospital dan beban yang besar ke atas sumber-sumber penjagaan kesihatan di negara-negara perindustrian termasuk Malaysia. Kemurungan, kebimbangan dan tekanan berlaku pada kadar yang tinggi di kalangan pesakit yang menderita ACS. Gejala kemurungan, kebimbangan dan tekanan muncul memberi kesan buruk semasa di hospital dan kesan jangka panjang kepada pesakit pasca-ACS. Walaupun prevalens yang tinggi dan kesan yang serius, tanda-tanda tersebut tidak dikenalpasti dan tidak dirawat pada kebanyakan pesakit ACS. Kajian ini bertujuan untuk menyiasat status psikologi pesakit ACS dan untuk memgenalpasti faktor-faktor yang berkaitan yang menyumbang kepadanya.

OBJEKTIF: Untuk menentukan prevalens dan faktor-faktor yang mungkin berkaitan dengan keadaan kemurungan, kebimbangan dan tekanan pesakit sindrom koronari akut di Hospital Universiti Sains Malaysia dan Hospital Sultanah Nur Zahirah.

METODOLOGI: Satu kajian prospektif keratan rentas untuk tempoh sepuluh bulan telah dijalankan daripada Ogos 2014 sehingga Mei 2015 ke atas pesakit ACS di HUSM dan HSNZ. Soal selidik yang terdiri daripada dua bahagian (data sosio-demografi dan

Skala Kemurungan, Kebimbangan dan Tekanan 21) telah digunakan dalam kajian ini. Soal selidik ini telah diedarkan kepada semua pesakit ACS yang dimasukkan ke wad. Prevalens kemurungan, kebimbangan dan tekanan dan faktor-faktor yang berkaitan dengannya telah dianalisis dengan menggunakan perisian SPSS versi 22 (IBM Corp, 2013).

KEPUTUSAN: Terdapat 400 orang pesakit ACS yang terlibat dalam kajian ini semasa tempoh kajian. Prevalens kemurungan, kebimbangan dan tekanan masing-masing adalah 80.3%, 85.8% dan 58.5%. Terdapat hubungan yang signifikan di antara jantina, penyakit jantung iskemia dan penyakit yang dengan kemurungan [p = 0.000, OR 2.545 (1.525, 4.248); p = 0.003, OR 2.301 (1.317, 4.021) dan p = 0.032, OR 2,297 (1.076, 4,904)]. Terdapat hubungan yang signifikan antara penyakit jantung iskemia dan kebimbangan [p = 0.013, OR 2,202 (1,185, 4,093)]. Terdapat hubungan yang signifikan antara penyakit iskemia jantung dan tekanan [p = 0.010, OR 1.730 (1.139, 2.626)]. Tiada hubungan statistik yang signifikan antara faktor demografi yang lain dengan kemurungan, kebimbangan atau stres.

KESIMPULAN: Kesimpulan yang dapat dibuat adalah terbukti bahawa prevalens kemurungan, kebimbangan dan tekanan adalah tinggi di kalangan pesakit ACS. Faktor-faktor yang signifikan adalah jantina, penyakit jantung iskemia dan penyakit lain. Subjek yang mempunyai penyakit yang lain dan jantina perempuan lebih cenderung untuk mempunyai kemurungan. Subjek yang mempunyai penyakit jantung iskemia lebih cenderung untuk mempunyai kemurungan, kebimbangan dan tekanan.

ABSTRACT

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INTRODUCTION: Coronary heart disease is the most common form of cardiovascular disease and frequently manifests as acute coronary syndrome (ACS) which includes a range of clinical conditions from angina pectoris, unstable angina, non-ST elevation myocardial infarction to ST elevation myocardial infarction. The ACS is a common cause of emergency hospital admission and a major burden on health care resources in industrialized countries including Malaysia. Depression, anxiety and stress occur at high rates among patients suffering an ACS. The depression, anxiety and stress symptoms appear to adversely affect in-hospital and long term cardiac outcomes of post-ACS patients. Despite their high prevalence and serious impact, the psychological symptoms are commonly unrecognized and untreated in most ACS patients. This study was to investigate the psychological status of ACS patients and to establish the associated factors that contribute to it.

OBJECTIVES: To determine the prevalence and its associated factors of depression, anxiety and stress condition of acute coronary syndrome patients in Hospital Universiti Sains Malaysia and Hospital Sultanah Nur Zahirah.

METHODOLOGY: A cross-sectional prospective study for ten months duration was done from August 2014 until May 2015 on eligible subjects of ACS patients in Hospital USM and HSNZ. A questionnaire consists of two sections (socio-demographic data and

Depression, Anxiety and Stress Scale 21) was used in this study. The questionnaire was distributed to all ACS patients admitted to wards. The prevalence of depression, anxiety and stress and their associated factors was analyzed using SPSS software version 22 (IBM Corp, 2013).

RESULTS: There were 400 patients enrolled into the study during the study period. The prevalence of depression, anxiety and stress were 80.3%, 85.8% and 58.5% respectively. There were significant associations between gender, ischemic heart disease and other co-morbid with depression [*p*=0.000, OR 2.545(1.525, 4.248); *p*=0.003, OR 2.301(1.317, 4.021) and *p*=0.032, OR 2.297(1.076, 4.904)]. There was significant association between ischemic heart disease and anxiety [*p*=0.013, OR 2.202(1.185, 4.093)]. There was significant association between ischemic heart disease and stress [*p* = 0.010, OR 1.730 (1.139, 2.626)]. There were no statistically significant associations between other demographic factors with depression, anxiety or stress.

CONCLUSION: We concluded that the prevalence of depression, anxiety and stress were high in ACS patients. The recognized significant associated factors were gender, ischemic heart disease and other co-morbids. Subjects who had other co-morbids and female gender were more likely to have depression. Subjects with ischemic heart disease were more likely to have depression, anxiety and stress.

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Conclusion: We concluded that the prevalence of depression, anxiety and stress were high in ACS patients. The recognized significant associated factors were gender, ischemic heart disease and other co-morbids. Subjects who had other co-morbids and female gender were more likely to have depression. Subjects with ischemic heart disease were more likely to have depression, anxiety and stress.

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Dr. Siti Azrin Bt. Ab Hamid : Co-Supervisor

1. INTRODUCTION

Cardiovascular disease (CVD) is a major cause of death and disability in developed countries. Although CVD mortality rates worldwide have declined over the past four decades, CVD remains responsible for about one-third or more of all deaths in individual over age thirty five. CVD are comprised principally of coronary heart disease (CHD) including stable and unstable angina, non-fatal myocardial infarction and coronary death.

The World Health Organization (WHO) reported that CVD cause 17.1 million deaths globally in 2004 and that 82% of the deaths took place in low-and-middle income countries. The WHO also projected that Southeast Asia would have the largest percentage increase in CVD-related deaths by 2030.

A study on the burden of disease using Disability-adjusted Life Years (DALY) showed that five leading diseases in Malaysia are ischemic heart disease (IHD) followed by mental illness, stroke, road traffic accident and cancers (WHO, 2013). CVD remains an important cause of mortality in Malaysia, accounting for 20-25% of all deaths in public hospitals. This has remained unchanged for the last ten years (CPG on Management of Acute Myocardial Infarction, 2014). According to the latest WHO data published in April 2011, CHD deaths in Malaysia reached 22701 or 22.18% of total deaths.

Acute coronary syndrome (ACS) is a clinical spectrum of ischemic heart disease, depending upon the degree and acuteness of coronary occlusion. It can present as unstable angina, non-ST elevation myocardial infarction (NSTEMI) or ST elevation myocardial infarction (STEMI) (Clinical Practice Guideline on UA/NSTEMI, 2011).

In 2009, approximately 683000 patients were discharged from United States hospitals with a diagnosis of ACS. Community incidence rate for STEMI has declined over the past decade, whereas those for non-ST elevation ACS have increased. At present, STEMI comprises approximately 25% to 40% of myocardial infarction (MI) presentation (O'Gara, *et al*., 2013).

There are approximately 124 000 myocardial infarctions every year and about 4.1% of men and 1.7% of women have had a MI in the United Kingdom (British Heart Foundation, 2010).

The estimated incidence of ACS in Malaysia is 141 per 100000 populations per year, and the in-patient mortality rate is approximately 7% (ACS Annual Report, National Cardiovascular Disease Database, 2006). In Malaysia, the in-hospital and 30-day mortality following STEMI is high at 10% and 14% respectively. According to the Report of the Acute Coronary Syndrome (ACS) Registry 2006, there was a total of 31,186 admissions to the 73 coronary care units (CCU) in the country. These include 37 CCUs in the Ministry of Health, 3 in the university hospitals, and the rest in the private sector in Malaysia. Of these admissions, 12,534 or 40% were due to Acute Coronary Syndrome (ACS).

In 2006, there were a total of 181 ACS patients admitted to the ward in tertiary hospital of Terengganu. Whereas in tertiary hospital of Kelantan, there was a total of 1438 ACS patients being admitted (ACS Annual Report, National Cardiovascular Disease Database, 2006).

Base on a study by Michelle DiGiacomo (2007) in which they included all women admitted to a metropolitan teaching hospital in Melbourne, Australia with a diagnosis of ACS between 6 and 14 months prior to participating in the study and assessed their psychological status. Mild to extremely severe levels of depression (33.4%), anxiety (39.6%), and stress (29.7%) were evident in the study. However, the weaknesses of the study were low response rate that was achieved; 33% and the study samples were small.

Depressive symptoms are an established predictor of mortality and major adverse cardiac event in patients with acute coronary syndrome. A study in New York revealed that enhanced depression care for patients with ACS was associated with greater satisfaction, a greater reduction in depressive symptoms, and a promising improvement in prognosis (Davidson KW, *et al*., 2010).

Compared with ACS patients who are not depressed, those who have depressive symptoms report more chest pain, use more primary care services and have more hospital readmissions. Besides, they are also less likely to return to work, less adherent to medical recommendation and experienced decreased life satisfaction.

Anxiety is a common experience among patients with acute coronary syndrome that can have a negative impact on health outcomes. Nonetheless, the negative role of anxiety remains underappreciated, as reflected by clinicians' under recognition and under treatment of anxious hospitalized patients with ACS (Abed MA, *et al*., 2013). The adverse impact of anxiety on health outcomes could be avoided by efficient assessment and treatment of anxiety.

Anxiety predicted greater major adverse cardiac events (cardiac death, myocardial infarction, cardiac arrest or non-elective revascularization) in 2 years after baseline. This outcome was reported by Nancy Frasure, *et al*. (2008).

In recent years, while awareness of depression and anxiety have increased in cardiology practice, awareness of the possibility of post-traumatic stress disorder (PTSD) due to ACS has been lagged .A meta-analytic review of ACS induced PTSD that was done by Edmondson D, *et al*. in 2012 found a 12% prevalence of clinically significant ACS-induced PTSD among ACS patients and based on a small number of studies, a doubling of risk of mortality and recurrent cardiac events among ACS patients with PTSD symptoms.

Identification of patients at risk of developing PTSD may have implication for prognosis for some reasons. There is evidence suggesting that cardiac patients with PTSD are at increased risk of recurrent cardiac events may be due to reduced compliance with cardiac medications. PTSD is also associated with inadequate coping, reduced quality of life and the use of tobacco and alcohol that in turn are risk factors for coronary heart disease. Therefore, the first aim of this study is to establish the level of

stress in ACS patients and the second aim is to identify early predictors of stress that might progress to PTSD later in life.

The evaluation of psychological status of ACS patients specifically in regards to depression, anxiety and stress in Malaysia is important because we have different social background and culture compared to other countries. As depression, anxiety and stress are recognized as risk factors for coronary heart disease that are potentially modifiable, there is a need to conduct such study in our own hospital settings to examine their self-reported levels of depression, anxiety and stress and to inform a long term secondary prevention risk strategy for all patients. Hopefully with the outcome of this study we may be able to identify the problems objectively and later lead to solutions to overcome it. The aim of our present study is to prospectively investigate the prevalence of depression, anxiety and stress among ACS patients. The second goal is to determine the associated factors contributed to it. Our hypothesis is that there will be a significant level of psychological distress among ACS patients and significant associated factors.

2. LITERATURE REVIEW

2.1 Overview

Coronary artery disease or ischemic heart disease is a broad spectrum of manifestations ranging from asymptomatic atherosclerosis to symptomatic stable angina, acute coronary syndrome and congestive heart failure (CPG Management of Stable Angina Pectoris, July 2010). CAD is a major cause of death and disability in developed countries including Malaysia. Although CAD mortality rates worldwide have declined over the past four decades, CAD remains responsible for about one-third or more of all deaths in individuals over age thirty five.

Globally empirical evidence documents that high levels of stress (Eric C & James H, 1987), anxiety (Smith & Gallo, 2001) and depression (Ford, *et al*., 1998) are associated with the risk of IHD. However, in Malaysia insufficient research data are available regarding the prevalence of psychological factors associated with risk of and ACS. The onset of depression, anxiety and stress follows a 'life event' or stressor. The kind of stressor likely to provoke depression, anxiety and stress is one that is severely life threatening with long term consequences such as ACS.

After ACS, major depression had a prevalence of over 10%, about twice that found in the general population. Less severe symptoms of depression are found in 20 to 30% of patients after ACS, with similar prevalence rates for anxiety and stress. Depression, anxiety and stress had been shown to result in increased mortality and

morbidity, reduced health related quality of life, poorer vocational outcomes, and delayed in returning to work. Despite the high prevalence of depression, anxiety and stress, the conditions remain under-recognised, poorly diagnosed and undertreated in ACS populations (John C Oldroyd, *et al*., 2013). Depression, anxiety and stress are common following acute MI. Post-MI patients with these psychological changes are less likely to adhere to treatment, more likely to drop out of exercise programme, less likely to modify cardiovascular disease risk factors and have increased the risk of mortality within the first six months post-MI (Di-Benedetto M, *et al*., 2007).

Findings of the study by Rafia Rafique and Naumana Amjad (2013) suggest that psychological factors such as perceived stress, depression, and trait anger were significantly associated with risk of IHD in the Pakistani population.

Despite their prevalence, depression, anxiety and stress often remained unrecognised and undiagnosed in this population. This might be due to issues such as brief hospitalisation periods (the average length of stay for ACS is now 3-5 days) and the fact that symptoms of depression, anxiety and stress with ACS could overlap. Left untreated, these psychological statuses have a significant impact on recovery and functioning and were associated with increased morbidity and mortality, poorer clinical, behavioural and psychological outcomes, and reduced overall quality of life.

A few co-morbids have been examined in this study to prove the associated factors of psychological status among ACS patients namely diabetes mellitus, hypertension, hyperlipidaemia, IHD and stroke. Therefore, the definition of each co-morbid were stated as below:

1. Diabetes mellitus is defined as chronic hyperglycaemia together with other metabolic abnormalities due to insulin resistance and/or deficiency as well as increase hepatic glucose output (CPG Management of Type 2 Diabetes Mellitus, 4th edition, May 2009).
2. Hypertension is defined as persistent elevation of systolic blood pressure of 140 mmHg or greater and/or diastolic blood pressure of 90 mmHg or greater (CPG Management of Hypertension, 4th edition, 2013).
3. Hyperlipidaemia is lipid values outside the norm (CPG Management of Dyslipidaemia, 4th edition, 2011).
4. Stroke is a clinical syndrome characterized by rapidly developing clinical symptoms and/or signs of focal, and at times global, loss of cerebral function, with symptom lasting more than 24 hours or leading to death, with no apparent cause other than that of vascular origin (CPG Management of Ischemic Stroke, 2nd edition, 2012).

A prime opportunity for depression, anxiety and stress screening for patients with ACS is before discharge from the hospital. Screening at this time most likely will reveal current or new onset depressive, anxiety or stress episodes which are more highly associated with adverse outcomes than is lifetime depression or anxiety. In 2008, the American Heart Association (AHA) with an endorsement from the American Psychiatric Association published a scientific advisory calling for routine screening for depression in patients with coronary heart disease. However, despite the AHA advisory, most hospitals have not instituted routine screening and most cardiac patients are discharged without systematic assessment for their psychological status. In order to alleviate the adverse outcomes, further treatment strategy and referral for ACS patients

should be done. These measures cannot be fulfilled until the health care providers can detect depression, anxiety and stress in ACS patients by using standardized screening procedure.

The DASS 21 is a 21 item self-reported questionnaire to assess the severity of the core symptoms of Depression, Anxiety and Stress. DASS 21-item is a modified and shorter version of the original version of DASS-42. Accordingly, the DASS allows not only a way to measure the severity of a patient's symptoms but a means by which a patient's response to treatment can also be measured. The DASS 21 consist of three self-report scales designed to measure the depression, anxiety and stress. There are 21 items with 7 items for each emotional state. The items in the depression scale focused on low mood, low self-esteem and poor outlook for the future. The anxiety scale items focused on fear response and psychological arousal, while the stress subscale was on persistent arousal and tension. The reliability of DASS was excellent in previous studies (Anthony, et al., 1998; Ramli, et al., 2007; Shea, et al., 2009) Whereas tools such as the Beck Depression Inventory only identify depressive illness and in Hamilton Depression or Anxiety Scales, there are many scales items that are poor contributors to the measurement of depression or anxiety severity and the content validity also is poor.

2.2 Acute Coronary Syndrome

Angina which means tightness in the chest that is often an indicator of heart disease puzzled many physicians in the 18th and 19th centuries. First described in 1768, it was believed by many to have something to do with blood circulating in the coronary arteries. The cardiologist, William Osler (1849-1919) worked extensively on angina,

and was one of the first to indicate that it was a syndrome rather than a disease in itself. Later in 1912, the American cardiologist James B. Hendrick concluded that the slow, gradual narrowing of the coronary arteries could be a cause of angina.

ACS is a term referring to a range of acute myocardial ischemia state that may result from plaque disruption and thrombus formation. These states include unstable angina (UA), NSTEMI and STEMI. UA refers to new onset of severe angina or accelerated angina; no rest pain, angina at rest within past month but not preceding 48 hours (angina at rest, subacute) or angina at rest within 48 hours (angina at rest, acute). A patient presenting with UA may progress to NSTEMI or even STEMI. The diagnosis of NSTEMI is established if a raised cardiac biomarker is detected. In STEMI, ST elevation may be present in the ECG, whereas in UA they are usually absent and even if there are present, are usually transient (CPG Management of UA/NSTEMI, 2011). STEMI is a clinical syndrome defined by characteristic symptoms of myocardial ischemia in association with persistent electrocardiographic ST elevation and subsequent release of biomarkers of myocardial necrosis. New or presumably new left bundle branch block (LBBB) has been considered a STEMI equivalent (O'Gara, *et al*., 2013).

CPG Management of Acute STEMI (2014) introduces a new comprehensive definition of MI which utilize new cardiac biomarkers and imaging techniques. It is more sensitive in diagnosing MI. MI is a clinical diagnosis based on the presence of myocardial injury or necrosis as indicated by a rise and fall of serum cardiac biomarkers. In addition, there should be at least one of the following; clinical history consistent with chest pain of ischemic origin, ECG changes of ST segment elevation or

presumed new LBBB, imaging evidence of new loss of viable myocardium or new regional wall motion abnormality, identification of an intracoronary thrombus by angiography or autopsy.

The symptoms of ACS include chest pain which is described as tightness or heaviness in the chest. The pain may be a pressure, squeezing or a severe crushing pain with a sense of impending doom. It is also associated with sweating, nausea, vomiting and shortness of breath. Chest pain begins abruptly and lasts more than thirty minutes. The location is the center of the chest and may radiate to the jaw or down the left arm. A significant number of patients especially women, diabetics and elderly present with atypical symptoms which include dyspnea without any history of chest pain, unexplained sweating, nausea and vomiting, syncope and pre-syncope, fatigue and epigastric discomfort.

Immediate treatment of ACS requires hospitalization and is aimed at destroying occluding blood clots and revascularization of the coronary arteries. Treatment of ACS is dependent upon differential diagnosis of myocardial ischemic state. It includes antiplatelet, anticoagulant, thrombolytic, percutaneous coronary intervention (PCI), angioplasty and stenting or coronary artery bypass surgery (CABG). The duration of hospital stay following ACS depends on the extent of myocardial damage, presence of complications and co-morbidities. Asymptomatic patients with uncomplicated ACS may be discharged after three to five days. Patients with complications may require a longer hospital stay.

Acute cardiac events are often highly traumatic experiences for the patients and their family. The acute event also signifies the beginning of a long period of physical rehabilitation, psychological adaption and lifestyle changes. Secondary prevention should be initiated in-hospitals. Patients should be advised on the benefits and importance of lifestyle changes.

Cardiac rehabilitation is aimed at improving the physical and psychological well-being of the patients. It has been shown to reduce mortality by approximately 20 to 25%. There was also a trend towards reduction in non-fatal recurrent MI over a median follow-up of twelve months (O-Gara, *et al.*, 2013). The core components of cardiac rehabilitation include patient assessment, on-going medical surveillance, nutritional counselling, blood pressure, lipid and DM management, smoking cessation, psychosocial and physical activity counselling, exercise training and pharmacological treatment as appropriate.

2.3 Depression and Acute Coronary Syndrome

Depression is a mood state of sadness, gloom, and pessimistic ideation, with loss of interest or pleasure in normally enjoyable activities, accompanied in severe cases by anorexia and consequent weight loss, insomnia or hypersomnia, asthenia, feelings of worthlessness or guilt, diminishes ability to think or concentrate or recurrent thoughts of death or suicide (M.Colman A, 2009).

Elevated symptoms scores on depression rating scale such as the Beck Depression Inventory (BDI) are even more common and may predict subsequent major depression. The availability of good social support reduced the likelihood of persistent depression after an acute coronary event (Francois L, *et al*., 1995).

Depression in the population may be under-recognized by primary care practitioners with low rates of treatment uptake and uncertainty regarding how to address depression amongst CHD patients (Huffman, *et al*., 2008). It has been proposed that depression post-MI is due to a lack of coping resources. Depressed patients had severe forms of maladaptive thinking and dysfunctional attitudes that were self-deprecating, felt dejected, experienced loss of pleasure, decrease activity and a loss of will to live (Ladwig, *et al*., 1991). Coupled with higher education and social status, the authors proposed the latter were factors protective against negative cognitions and subsequent depression. Furthermore, they suggested that this subgroup might be optimistic.

A systemic review study by O'Niel A, Sanderson K & Oldenburg B (2010) in their findings suggested that depression in ACS patients recorded between admission and up to two months post discharge was significantly predicted poorer return to work outcomes 6 to 12 months after a cardiac event.

2.4 Anxiety and Acute Coronary Syndrome

Anxiety is a state of uneasiness, accompanied by dysphoria and somatic signs and symptoms of tension, focused on apprehension of possible failure, misfortune or danger (M.Colman A, 2009). The association between anxiety and ACS can be a causal and prognostic factor in either way. One possibility why anxiety might increase the risk of cardiac event is that generalized anxiety disorder may cause surges of cortisol and other stress hormones, the same chemicals involved in the "fight or flight" response, and that this may trigger heart attacks and other cardiac events.

Intense subjective distress and fear of dying immediately after an acute coronary event increased the risk for clinically significant anxiety one week to several weeks after the event (L.Whitehead D, *et al*., 2006). Some patients with coronary disease have a family history of the death of the parent as a result of same illness. The history is often associated with the conscious fantasy that the patient's death at the age at which the parent died is inevitable, leading to considerable vigilance, avoidance and other anxiety behaviours (Kretchy I.A, 2014).

Moser, *et al*. (2011) investigated the role of anxiety (defined as anxiety during hospitalisation and three months post discharge) and predicted outcomes in ACS patients. They found out the highest risk of developing adverse outcome was determined by persistent anxiety, intermediate risk associated with anxiety at one time point only and lowest risk associated with no anxiety.

Compared with the extensive literature on depression in patients with CAD, relatively few studies have examined the role of anxiety. Some studies have reported anxiety symptoms to be predictive of subsequent cardiac events, mortality, and in-hospital complications in patients with CAD. Martens, *et al*., (2010) have found that participants with baseline generalized anxiety disorder (GAD) had a greater rate of subsequent cardiovascular events than did participants without GAD. Todaro *et al*. (2007) reported the lifetime prevalence of anxiety disorders to be 45.3% in patients with CAD. In addition, Durmaz, *et al*. (2014) investigated the relationship between anxiety and coronary slow flow (CSF). Unlike the other studies in the literature, their study utilized State-Trait Anxiety Inventory (STAI) for anxiety. They found that STAI scores were significantly higher in the CSF group.

2.5 Stress and Acute Coronary Syndrome

Stress is a psychological and physical strain or tension generated by physical, emotional, social, economic, or occupational circumstances, events, or experiences that are difficult to manage or endure (M.Colman A, 2009). According to DSM 5, post-traumatic stress disorder (PTSD) was no longer an anxiety disorder. It was put into a new category of trauma and stressor-related disorders. PTSD definition is exposure to actual or threatened death, serious injury, or sexual violence that can be actual victim or witness with four symptom clusters e.g. re-experiencing,numbing, avoidance, and hyperarousal and hypervigilance.

PTSD can be a consequence of an ACS, which occurs in approximately one in every eight patients. PTSD secondary to ACS is associated with approximately double

the risk for recurrent cardiac events and mortality. Both acute cardiac events and PTSD are associated with sympathetic activation and elevated pro-inflammatory cytokines. It is possible that these additive effects are damaging to the heart. PTSD is prevalent in survivors of out-of-hospital cardiac arrest, with a prevalence ranging from 27% to 38% (P.Andrade, J., J.Pinto, F. & K.Arnett, D., 2015).

Symptoms indicative of PTSD such as intrusion, avoidance and emotional numbing and hyperarousal have been reported by people in the months after acute MI. PTSD after MI is associated with poorer general functioning, reduced adherence to drug treatment and increased likelihood of cardiac readmission. It is therefore valuable to identify those people who are vulnerable to PTSD after ACS event.

Whitehead, *et al*., (2006) in their prospective study over 135 ACS patients admitted to United Kingdom hospitals, showed 14.8% of them developed symptoms pattern characteristic of PTSD at three months, assessed by the Post-traumatic Stress-self report version. They also reported that patient vulnerability to PTSD after ACS was predictable on the basis of psychological state and chest pain at the time of admission. However, in contrast, demographic factors in the study which were age, sex, education level and income were unrelated to post-traumatic symptoms.

Continued stress at work or home, along with financial stress and stressful life events during the previous year, were documented to lead to the onset of the disease, and were found to be associated with increased incidence of MI (Rosengren, *et al*., 2004). The Risk Corn Study (Nishtar, *et al*., 2004) is the only large-scale study carried out on native Pakistani population aged 25 to 70 years. Besides many lifestyle, genetic,

ethnic, anthropometric, and biochemical risk factors, stress was found to be associated with the risk of IHD. Research has shown that chronic stress plays a significant role in the development of heart disease. Exposure to chronic stress may negatively affect cardiac health directly through neuroendocrine mechanisms or as a result of its link to unhealthy behaviour and other risk factors, such as high blood pressure, smoking, and physical inactivity (Macleod, *et al*., 2002). Various life stressors can lead to chronic states of stress, such as work stress, socioeconomic stress and marital stress. Studies have shown that work-related stress is related to an increased frequency of adverse cardiac events (Rozanski, *et al*., 2005).

Survivors from acute MI may be prone to develop symptoms of PTSD such as re-experiencing (e.g., recalling the cardiac event or defibrillator shocks, dreams of cardiac arrest, flashbacks of medical interventions and surgical procedures), avoidance (e.g., avoid reminders of the cardiac event such as the location of the event, the hospital, medication, situations in which heart rate increases such as exercise or sexual activity), and arousal symptoms (e.g. preoccupation with heart rate or chest pain; insomnia) (Heather Tulloch, *et al*., 2015).

2.6 Factors Associated with Depression, Anxiety and Stress

There were several factors that contribute to epidemic rates of depression, anxiety and stress worldwide including demographic factors (age, gender and race or ethnicity), social support, socioeconomic status and medical comorbid.

Aging is one of the main factors for the development of late-life mental illness.Depression in older adults may be linked to several important risk factors. These include medical illness (particularly chronic health conditions associated with disability/decline), perceived poor health, disability, or chronic pain, progressive or disabling sensory loss, history of recurrent falls, sleep disturbances, cognitive impairment or dementia, medication side effects, alcohol or prescription medication misuse or abuse, prior mental illness, extended or long-standing bereavement, stressful life events (Amy Fiske, *et al*., 2009).

Women are at least twice as likely as men to suffer from depression and anxiety disorders, including unipolar depression, dysthymia, panic disorder, post-traumatic stress disorder, generalized anxiety disorder and phobias. The most likely explanation is compared to men, women are subject to greater fluxes in reproductive hormones across the life span. Changes in reproductive hormones in utero, during puberty, pregnancy, and menopause clearly alter brain structure and function, and are likely to play a role in the increased prevalence of affective disorders in women (Margaret Altemus, 2006).

In a study by Maideen, *et al*. (2014) among 1556 adult participants in the community of Selangor, they reported that among the socio-demographic characteristics ethnicity was found to be associated with depression ($p<0.05$). The prevalence of depression was highest among the other ethnic groups (17.6%), followed by Chinese (13.8%), Malays (10.8%) and Indians (6.1%).

Good social support especially being married play an important role in health behavior, medication adherence and clinic or rehabilitation programme attendance in

any patient. There was a potential psychophysiological factor which may link the marital status to health. Individual who had being divorced or separated was found to have increased in blood pressure and exhibited greater emotional distress (Gemma Hutton, 2013).

Socioeconomic status including education, income, and occupational status play a major role in affecting the psychological status. People belonging to low socioeconomic status were at a greater risk of inducing sickness mentally. More financial hardship, poorer housing conditions, work stress, poorer and more physically repetitious working conditions and less job security were characteristic of low socioeconomic status. Thus, low socioeconomic status could be viewed as a composite chronic psychological stressor that finally lead to depression, anxiety or stress (Alan Rozanski, *et al*., 2005).

In a cross-sectional study by Scott B. Patten, *et al*. (2005) over 115071 subjects in Canada, they concluded that there was a diverse set of long term medical conditions that were associated with depression. There were chronic fatigue syndrome, hypertension, diabetes mellitus, and thyroid disease, various gastrointestinal, neurologic and respiratory conditions.

The prevalence of depression, anxiety and stress are high in patient with comorbid medical condition than in those with no comorbidity such as stroke, cardiovascular disease, chronic obstructive pulmonary disease and diabetes mellitus. The impact of medical comorbidity may mask the psychological symptoms. The psychological status complicate the prognosis of medical illness by increasing physical

disability, decreasing motivation and adherence to prescribed medications, exercise or rehabilitation programme (Yohannes A.M & Baldwin R.C, 2008).

Up to 80% of patients with diabetes mellitus will experience a relapse of depressive symptom over a 5-year period. Depression is associated with non-adherence to diabetes self-care including following dietary restriction, medication compliance and blood glucose monitoring resulting in worse overall clinical outcome. Patient with depression and a medical comorbid are three times as likely as medically ill patient to be non-adherent to treatment recommendation (Wyne J.Katon, 2008)

Patient with chronic medical condition like hypertension may experience many negative emotions which increased their risk for the development of mental health disorders particularly depression, anxiety and stress. The stress of having a chronic medical condition may potentially influence medication adherence behavior (Kretchy, *et al*., 2014).

There is a strong link between IHD and psychological distress which can be etiological and prognostic indicator to IHD. The factors associated with IHD were heart rate variability, atherosclerosis, endothelial dysfunction, vascular inflammation, smoking, social isolation, hyperlipidaemia and poor adherence to treatment (Khayyam-Nekouei Z., *et al*., 2013).

The above factors mentioned clearly have association with depression, anxiety and stress in general population. Therefore, in this study we have examined the above associated factors with the psychological status in ACS patient.

3. RESEARCH QUESTIONS , HYPOTHESIS AND OBJECTIVES

3.1 Research Questions

1. What are the prevalence level of depression, anxiety and stress condition of Acute Coronary Syndrome (ACS) patients in Hospital Universiti Sains Malaysia (HUSM) and Hospital Sultanah Nur Zahirah (HSNZ)?
2. What are the associated factors of depression, anxiety and stress condition among acute coronary syndrome (ACS) patients in Hospital Universiti Sains Malaysia (HUSM) and Hospital Sultanah Nur Zahirah (HSNZ)?

3.2 Research Hypothesis

1. There will be a significant different level of psychological distress among acute coronary syndrome patients in Hospital Universiti Sains Malaysia and Hospital Sultanah Nur Zahirah.
2. There are several associated factors of depression, anxiety and stress condition among acute coronary syndrome patients in Hospital Universiti Sains Malaysia and Hospital Sultanah Nur Zahirah.

3.3 Objectives

3.3.1 General objective

1. To determine the psychological status among acute coronary syndrome patients in Hospital Universiti Sains Malaysia and Hospital Sultanah Nur Zahirah.

3.3.2 Specific Objectives

1. To determine the prevalence of depression, anxiety and stress condition among acute coronary syndrome patients in Hospital Universiti Sains Malaysia and Hospital Sultanah Nur Zahirah.
2. To identify the possible associated factors of depression, anxiety and stress condition among acute coronary syndrome patients in Hospital Universiti Sains Malaysia and Hospital Sultanah Nur Zahirah.

4. METHODOLOGY

4.1 Study Design

This was a cross-sectional study. This study design was chosen because it was a one-time study and did not require a follow up. The end results of this study were to determine the prevalence and associated factors of depression, anxiety and stress condition among ACS patients in HUSM and HSNZ.

4.2 Study Approval

. This study was approved by the Emergency Department review board and University Ethical & Research Committee on 4 August 2014. In Hospital USM, the consent was obtained from the Hospital Director

While in HSNZ, the consent was obtained from the Hospital Director and was approved by the Medical Research & Ethics Committee (MREC), Ministry of Health on 10 July 2014 by registering with the National Medical Research Register (NMRR). The registered NMRR ID was NMRR-13-1469-18867.

4.3 Study Duration

This study was conducted from August 2014 until May 2015.

4.4 Study Location

Hospital USM and HSNZ were chosen as the researcher's study locations as both hospitals are the tertiary centers in the state of Kelantan and Terengganu respectively. The data would represent the in-hospital population of ACS patients that came from the whole districts in Kelantan and Terengganu.

Becoming an APEX University (Accelerated Programme for Excellent), Hospital USM indeed was committed to function as teaching and referral hospital in the east cost of Peninsular Malaysia. Currently, Hospital USM exhibit 747-bed complement, in which there were about one to two patients per day who are diagnosed as ACS being admitted to the medical ward.

Meanwhile, HSNZ is located in Kuala Terengganu district, near to Batu Burok beach was established since 1920s.It has 821 bed capacities and there were about an average of 3 patients per day being admitted to the medical ward with a diagnosis of ACS.

The sample population was taken from medical department as all ACS patients that presented to Emergency Department in both hospitals will be admitted to medical ward including general wards, Coronary Rehabilitation Ward (CRW) or Cardiac Care Unit (CCU).